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ABSTRACT

The holistic nature of the human experience and the reality of human functioning need to be considered by the industrial arts profession; an overemphasis on psychomotor functioning to the exclusion of affect and cognition, will ultimately win the profession neither acceptance nor effectiveness. The nature of learning involves a range of inter-related factors which tie in well with industrial arts activities, which by nature are also multi-sensory. Moreover, we know that personal outcomes are greatly enhanced when these experiences are first hand and actively experienced by the learner. Therefore, the industrial arts laboratory should be utilized not as a shop in which one makes things, but rather as a laboratory of diverse facilities associated with life, industry, and technology, functioning to serve as a living-learning environment for the development of the total person. The effective teacher attempts to establish connections or linkages between class or laboratory activities and individual student frames of reference. (Five recommendations are made as to how the profession can enhance the development of the whole person.) (MEK)

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INDUSTRIAL ARTS PUTS THE WHOLE BOY AND GIRL IN THE SCHOOL IN 1980

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Education, however, is not just something that happens in the head. It involves our muscles, our senses, our hormonal defenses, our total biochemistry. Nor does it occur solely within the individual. Education springs from the interplay between the individual and the changing environment

Toffler (1974)

INDUSTRIAL ARTS PUTS THE WHOLE BOY AND GIRL
IN THE SCHOOL IN 1980

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The title "Industrial Arts Puts the Whole Boy and Girl in the School in 1980," raises a number of interesting as well as challenging questions.

1. What is meant by the words "whole boy and girl?"
2. Has the "whole boy and girl" been staying away from school? -- If so, what parts stayed home or away?
3. Why must Industrial Arts start putting the whole person in school in 1980? -- Has it not been doing so all along?
4. Why have we not done it before; or perhaps we have?
5. What would we do if we in Industrial Arts really wanted to put the whole boy or girl in school?

We already have raised more questions than can be adequately answered in the span of this discussion. So, let us deal with the topic in such a way that some if not all of the questions can be partially answered by inference or even directly at times. In order to do that, it might be wise to establish a series of propositions that will in some way foretell some of the bases on which the discussion will be built. These propositions are as follows:

1. The nature of learning involves a range of inter-related factors and elements which interface with and depend upon a variety of human processes.
2. The Industrial Arts activity is based on the idea that the learner is involved in an experience that is multi-sensory. As such, it has the

potential for the learner to use the senses of smell, taste, touch, sight and hearing.

3. The Industrial Arts activity has a rich potential for a strong intellectual involvement in such functions as creating, analyzing, assimilating, and perceiving.

4. The Industrial Arts activity has the potential for a deep personal involvement as such experiences deal with the factors of interests, likes, aspirations, curiosities, motivations, dreams, emotions, values, cares, satisfactions, and fears of the learner.

5. The Industrial Arts activity has the great potential for the learner's involvement in the motor functions which relate to fine muscle control, large muscle control, and the coordination of the physical and mental capabilities of the individual.

6. There are strong connections between the motor activities and the intellectual factors of creating, analyzing, assimilating, and perceiving. These same potentials for connections exist between the personal and the motor.

7. The Industrial Arts activity provides a rich arena for the student to engage in learning experiences directed towards the achievement of developmental tasks at the several levels or growth periods.

8. The wholeness of the educational and growth processes for the learner is based on the concept that the intellectual, personal, motor, and developmental task factors are dependent on each other.

9. The dimensions of wholeness in an educational sense for the individual is achieved when the learning process maximizes the human potential for involvement in that process. That is to say, if one can learn about the properties of wood through the senses of smell and touch, and there is no opportunity to use those senses in the learning experience then the concept of wholeness is not fulfilled.

10. The flexibility of the program and comprehensiveness of its structure plus the additional ingredient of a creative, imaginative, effective teacher are essentials to the process of educating the whole child.

An elaboration on these propositions will be made in the discussion that follows. This discussion will be directed towards four areas that individually and collectively must be considered in an effort to put the whole boy and girl in school in 1980. These areas include:

1. The sensory system for seeing, hearing, smelling, tasting and touching.
2. The physical motor control and the coordination of the mental, biological and physical units within the individual.
3. The psychological, emotional, and personality factors related to the learning process.
4. The developmental tasks of the learner.
5. The development and integration of global strategies that provide for a maximum involvement design.

Figure 1 graphically illustrates the concept of wholeness that will be elaborated on in the sections that follow. This figure portrays the learner as "The Student Incorporated" with all communications passing through a multi-sensory system. All of the components are linked together directly and indirectly in the "person" incorporated concept.

The Sensory System. The "whole person" concept must deal with that important dimension which involves the sensory system through which the individual is able to receive messages and stimuli from people and things in the environment. This multi-sensory system consists of the senses of smell, taste, touch, sight, and hearing. The importance of their consideration in this discussion of the whole learner is based upon a principle in education which states that-- the degree to which an individual can learn about anything is dependent upon the use of all of the senses that can be brought to bear on that subject.

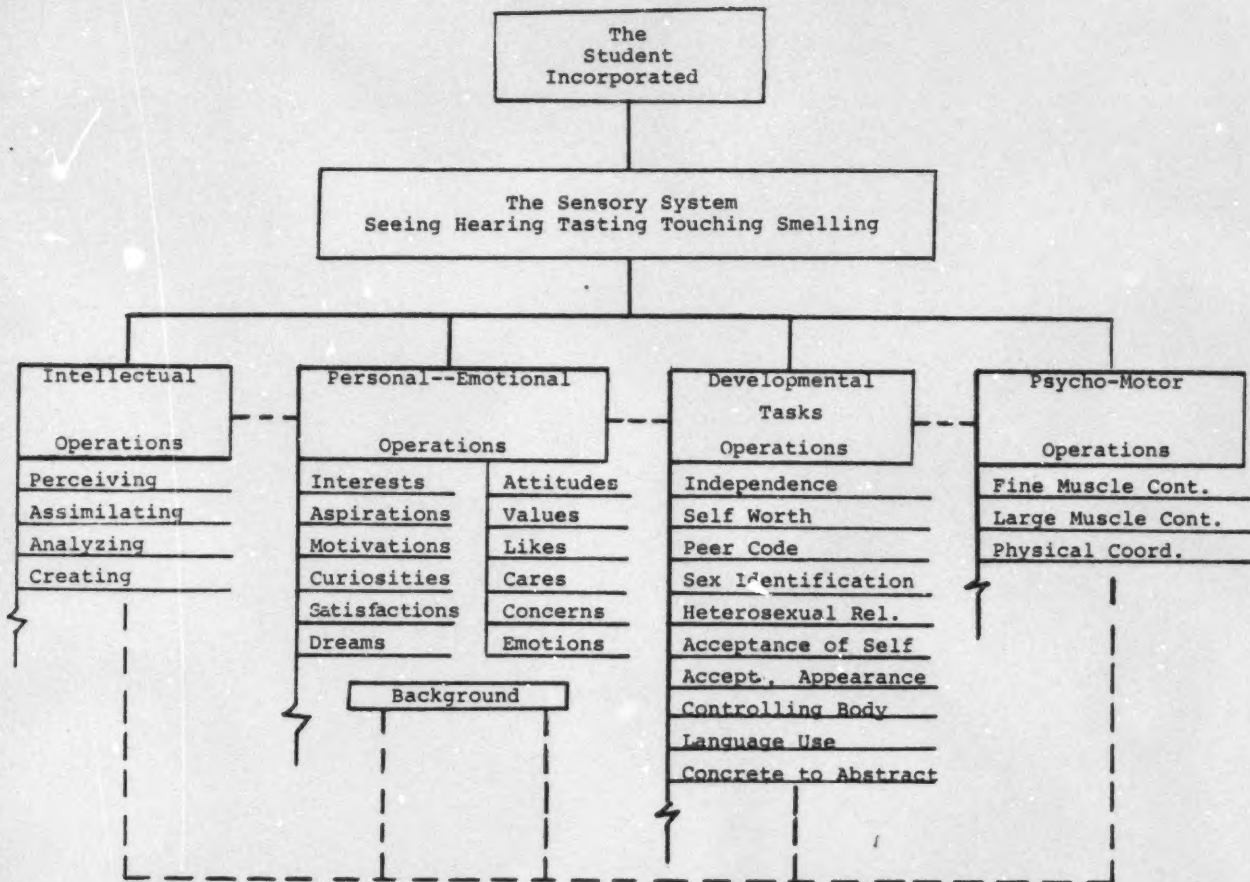


Figure 1. 7

Much of what is done in the Industrial Arts laboratory is a multi-sensory involvement on the part of the learner. This normally includes the sensory involvement of the eyes, nose, ears, and hands.

As an example; the turning of a piece of wood in a lathe provides the learner with such sensory input as --

- .. hearing the lathe operate,
hearing the tool cut into the wood,
hearing the differences in sounds caused by different tools or speeds,
hearing the sounds from different woods,
hearing differences in sounds due to the mounting or construction of the lathe,
- .. seeing the tool enter into the wood,
seeing the chips come off the wood,
seeing the nature of chips or cuttings,
seeing the differences caused by various turning tools,
seeing the differences caused by different cutting speeds,
- .. smelling the odor of the wood chips,
smelling the odor of the equipment,
smelling the odor caused by a non-lubricated tail stock center,
- .. touching when applying the tools to the wood stock,
touching or feeling the turned stock (after stopping the machine),
feeling the vibrations in the machine at different speeds,
feeling the variations in tool control from rough to finish turning,
feeling the force needed to control the tool.

(The sense of taste in this example has not been included for obvious reasons.)

These are just some of the ways in which the various senses serve the student in the wood turning operation. However, it is important to note that much of this communication can only happen (in the most realistic sense) by having the student experience such phenomena on a first-hand basis. As examples: the sense of touch under these conditions can not be described in words or pictures; the odor of the fresh turned wood can not be described in words with any degree of commonality of understanding; or the force required to hold and guide the various tools into the wood cannot be communicated by words.

What might be even more significant is the sensory perception that the student has when the senses of touch, sight, smell, and hearing are functioning

as a series of integrated input into the mind of the student. The "whole" person becomes a part of the process and the resultant learning is organismic in its impact on the learner since it involves several of the major sensory systems in a coordinated-overlapping design.

The idea might be carried one step further by asking the question: "What would be lost in the student's learning if there was no physical involvement with the tools, materials, or equipment and the learning process involved only a reading assignment or a lecture on woodturning?" This is another part of the case for Industrial Arts in the education of the whole person through the involvement of the whole person.

Let us now take that same example of woodturning on a lathe and move it beyond the sensory inputs or sensory perceptions that contribute to one's knowledge from the turning of a piece of wood. The experience of performing such an operation has the potential for such deeper personal dynamics as having the student --

- .. observe the power one has over materials associated with his/her environment,
- .. observe the control one has over the equipment and its operation,
- .. explore one's creative or artistic talents in the variations of turning designs that are possible,
- .. explore one's interests in wood, wood shaping, and its potential applications,
- .. produce an object of value to him or herself,
- .. achieve status in his/her peer group for performance on the lathe, or
- .. explore one's interest in working with wood as a vocation or avocation

These additional, deeper personal outcomes are possible or at least greatly enhanced by the "whole person" involvement in such first-hand, multi-sensory experiences. The Industrial Arts in its design for putting the

"whole" student into the educational process makes such deeper and more concrete learnings possible. It is in fact a living-learning involvement with the materials, products and processes of Industry and Technology.

Physical Motor Involvement. Education has traditionally been of the mind. Since the mind is the principal repository of all past experiences, and since the mind functions as the principal control and integration center for much of one's intellectual activity, the processes of education have tended to treat the mind's development in isolation from its dependence on the other components of the human. It is further recognized that much of this development of the mind has been attempted through the use of symbols in a second-handed and abstract manner. It also has been attended by learning in a passive participation mode.

This preoccupation of mind development has limited the concern on the part of educators for the broader dimensions of how the mind gains access to stimuli which can greatly impact on the quantity and quality of learning that takes place. It is here where the Industrial Arts experience can provide new dimensions of intellectual development. The potential for action learning and the implementation of kinesthetically involved processes become major sources of intellectual substance that can not be achieved by the most clever of abstract symbols.

Let us take a simple example of communications to the mind which illustrates the functioning of the passive-symbol learning and then the nature of input by action or kinesthetic stimuli.

Example "A": The label on a sack of cement contains the wording: "Net weight 25 pounds."

The message to the mind is related to the figure "25". Is that heavy, or is it light" The answers to these questions remain a mystery because the system of communication does not answer those questions. Even if the

symbols contained the notation "Net weight 25 pounds -- heavy" what more does the learner have than to believe or remember that the net weight was 25 pounds and is labeled "heavy". The word heavy has no real meaning because such a term is relative to the strength capability of the person to whom it is directed. The message to the mind in this case has come through a second-handed process.

Example "B": The individual sees the label on the sack of cement: "Net weight 25 pounds -- heavy."

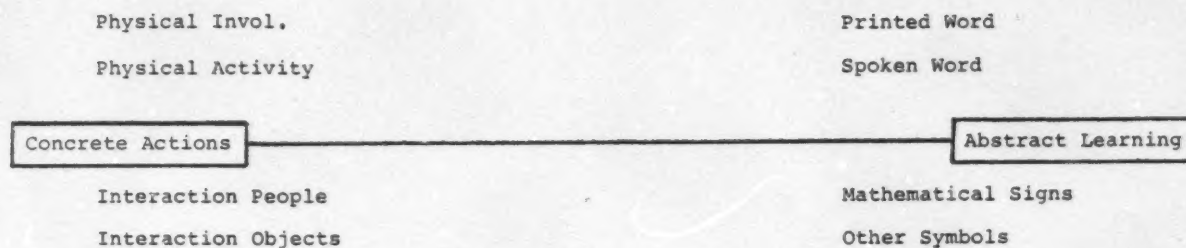
However in this case the person goes beyond the written symbols and their "perception" to him/her. The person engages in action learning with kinesthetic involvement and proceeds to lift the sack of cement. It is at that point where the person gains a perception of the strength required to lift 25 pounds (in a sack), -- a perception of the relationship between him/herself and such a weight, -- and also a perception of what society has chosen to identify as 25 pounds or heavy. This is a form of action learning. It is also a first-hand experience. Perhaps one might want to examine the effectiveness of these two systems -- the active versus the passive, or the first-handed versus the second-handed. Figure 2 is a graphic presentation of a continuum in learning experience as the process moves from the concrete to the abstract or the abstract to the concrete.

Alfred North Whitehead (1952) in discussing the differences between these two systems of learning, made the following comment:

"...First-hand knowledge is the ultimate basis of intellectual life. ...What the learned world tends to offer is one second-hand scrap of information illustrating ideas derived from another second-hand scrap of information. The second-handedness of the learned world is the secret of its mediocrity..." (p.61)

One might take that example and rationalize that the context of "25 pounds net weight -- heavy, " is of no intellectual consequence. Such an inference is to miss the point. The issue is one of a process of how practi-

Figure 2
The Learning Spectrum



It is only through such learning experiences (Industrial Arts)
that the potential for action learning styles can be identified
as within the repertoire of learning of any individual....
Lloyd Nielsen

cally all humans learn. It is also an issue of the quality of the learning and the accuracy of the meaning attached.

The secret of action-learning effectiveness at the higher or lower domains of intellectual activity is essentially one of the nature and quality of the action learning experience. A great deal will also depend upon the inferences and generalizations that grow out of the action or kinesthetically inspired experience. The teacher of Industrial Arts plays a major role in such learning experience design.

As one examines the role of Industrial Arts in this broad arena of action learning in association with the kinesthetic, we must go beyond the issue of fine or large muscle control and coordination. The end sensory organs located in muscles, joints, and tendons that are activated by physical movement or contact with other elements are a part of the system. Not only is there a manipulative and coordinative capability, there is also the sensory communication process which serves as a prime source of mental enrichment.

A few examples out of an endless number of potential items might serve some usefulness in this area of the discussion. The kinesthetic involvement may provide communication to the mind about such items as --

- .. the hardness or softness of materials
- .. the difficulty to move, lift, or release items
- .. the texture of materials
- .. the pliability of certain materials
- .. the consistency of materials
- .. the weight of items
- .. the relative differences in weight, consistency, and texture of material
- .. the ease or difficulty of working with various materials
- .. the power one has over materials, objects and equipment
- .. the sensitivity of selected functions or operations

- .. the tiring nature of some tasks
- .. the level of coordination required
- .. the ease of certain tasks through the use of levers and other forms of mechanical advantage
- .. etc.

The list of such physical-kinesthetically involved sense perceptions through Industrial Arts could fill many more pages. But, what is additionally important is the quality and accuracy of the perception that results from such first-hand interaction with the products, processes, and materials of industry and the world beyond the self.

The physical contact needs of the individual were stressed by Ivan Illich (1972/74) in his discussion of "The Alternative to Schooling."

If a person is to grow up he needs, first of all, access to things, to places and processes, to events and to records. He needs to see, to touch, to tinker with, to grasp whatever there is in a meaningful setting. (p. 121)

Action learning frequently involves the whole person in most, if not all, of his/her learning processes. The actual construction of an object from wood, metal, or other material can be a total involvement process wherein the physical-motor, the intellectual, and the personal-emotional interact as a coordinated unit. As a result of such constructional activity there is the potential for mental, physical-motor, and emotional growth on the part of the learner.

Action learning does not necessarily imply the need for making a project. The development of one's ability to lead others is greatly enhanced by actually having the opportunity to lead and practice leading under the direction of a skillful teacher. The same may be said for designing, problem-solving, researching, planning, and inquiring. Each of these can be strengthened through the active involvement and practice in such experiences in a life-like and

meaningful setting. Action learning in each of these instances is vital. Of course the teacher's role and the nature of the program will play important parts in the process of such development.

It would be helpful if the Industrial Arts laboratory were visualized and utilized not as a shop to make things, but as a laboratory of diverse facilities associated with life, industry, and technology, and that the function of such a facility was to serve as a living-learning environment for the development of the total person -- not just the psycho-motor, the affective, or the cognitive, but all of these.

The Psychological-Emotional Matrix. There is another system at work in every student that has relevance to this discussion of the total learner involvement. It functions in all areas of education and has a particular relationship to Industrial Arts. This is the complex psychological matrix related to the emotional and personality factors that reside within the person. These factors include such phenomena as one's curiosities, interests, motivations, likes, dislikes, fears, drives, aspirations, values, and sensitivities.

The boy or girl who enters the classroom or laboratory comes equipped with all of these, but never in the same quantity or quality. This is an acute area of individual differences that must be reckoned with if the whole person is to be put into the school. Nathaniel Cantor (1961) provided a good description of the circumstances for many students when he wrote --

The pre-adolescent and adolescent find themselves in high school. How little the average high school teachers appreciate the nature of the real problems of their pupils! The teachers want "to train the mind", fill it with ideas and facts by means of lessons to be "learned". The pupils "take it" and return it. Their curiosities, confusions, imaginations, loves, and hates, with regard to themselves, their parents and others, belong in a world almost totally ignored by the school. Their real problems remain more or less concealed. (p. 92)

The degree to which a program reaches the student, makes the appropriate connections, or establishes relevance is in a large measure related to the

compatibility or the harmonic of the relationships that can be established with these sensitive human factors.

The obvious key to this relationship is the diversity and dimension of experiences available to the student to make the necessary linkages. Also, it is the diversity and dimension of experiences that will provide for increasing the number of "total" student involvements that take place in the program.

As an example: a narrow, limited activity program that requires all students to do the same things, -- a program of limited scope and also strongly affected by teacher domination, leaves very little opportunity for student interests, motivations, likes or values. Thus, without these important connections, the vital human mechanisms that energize the system are not permitted to function in support of the teaching learning process.

There are several forms of Industrial Arts experiences that have potential for a broad spectrum of choices, interests, motivations, likes, values and curiosity for the student due to a wide range of student activity structured into each. These include such well-known experiences as --

- .. broad gauge anthropological unit studies,
- .. broad gauge contemporary unit studies,
- .. broad gauge futuristic unit studies,
- .. comprehensive group project involvement, and
- .. broad gauge research and experimentation programs.

Each of these has the potential for dealing with the issues of relevance and striking a harmonic relationship with the various complex psychological factors previously listed. However, if on the other hand the program and its operation --

- .. discourages curiosity, interest, or aspirations,
- .. is based upon teacher or narrowly conceived interests,

.. does not allow for student likes, or concerns, and

.. is not geared to the individual's motivations,

it is quite obvious that the whole body may be present but the whole person is not getting into the act.

Any discussion of putting the whole boy or girl in the school must give some concern to the factor of student background. This includes all those dimensions in the individual's past which in some way influence the nature of the present being. This would include one's ethnic, religious, educational, cultural, economic, social and political background.

The realities of the background factors are readily discernable as one examines the differences in students as manifested through their habits, aspirations, insecurities, motivations, manners, dress, language, ideas, values and sensitivities.

An awareness of the background factors may be of considerable help to the teacher in his or her attempt to reach or involve a student. The effective teacher attempts in various ways to establish the connections or linkages between the individual's background and the activities in the class or laboratory.

Saylor (1973) in a discussion titled "What is Relevant for Today's Students?" identified an extensive list of background factors that tend to shape the development of the individual.

"From the standpoint of the student, primary consideration must be given to his or her capabilities and potentialities, motivations, aspirations, self-concepts, status of personal, intellectual, emotional, and social development, interests, "hangups," the nature and character of the family or foster family and peer group relationships and **not** eliminate the whole gamut of similar characteristics that shape the development of the individual." (p. 42)

Student Development Concern. Another element that enters into the picture when one is attempting to establish educational programs for the whole child or student is what has been identified as the developmental tasks of an in-

dividual. Such tasks are described by Dr. Robert J. Havighurst (1953) as follows:

... A developmental task is a task which arises at or about a certain period in the life of an individual, successful achievement of which leads to his happiness and to success with later tasks, while failure leads to unhappiness in the individual, disapproval by the society, and difficulty with later tasks. (p. 2)

The concern in this case centers around the personal nature of the program and how it permits the boy or girl to pursue with some degree of effectiveness the particular tasks that he or she is attempting to achieve during that period in life. The importance of such tasks in the lives of the students merits their consideration in this discussion of putting the whole individual in the school.

Developmental tasks have been developed for the various growth stages of the individual such as: early childhood, late childhood, early adolescence and late adolescence. As an example of a set of developmental tasks for a given level, the following have been identified for the period of early adolescence. Tryon and Lilienthal (1950)

1. Establishing one's independence from adults in all areas of behaviors.
2. Accepting one's self as a worthwhile person, really worthy of love.
3. Behaving according to a shifting peer code.
4. Strong identification with one's own sex motor.
5. Learning one's role in heterosexual relationships.
6. Reorganizing one's thoughts and feelings about one's self in the face of significant bodily changes and their concomitants.
7. Accepting the reality of one's appearance.
8. Controlling and using a new body.
9. Using language to express and to clarify more complex concepts.
10. Moving from the concrete to the abstract and applying general principles to the particular. (pp. 84-87)

The so-called "whole person" during the period of early adolescence comes into the laboratory or classroom as a physical, biological, and emotional

being and also as one who is striving to achieve the particular tasks of importance to him or her at that time. If the program is to deal effectively with the whole person it must make provision for the individual to --

- .. establish independence from adults,
- .. accept one's self as a worthy person,
- .. control and use a new body,
- .. use language to express and clarify more complex concepts,
- .. etc., etc.

The indifference of teachers and programs to such personal needs for achievement simply implies that one can "educate" the person without any attempt to coordinate the processes and content with the principal concerns of the individual. Such neglect has been a factor in school discipline as well as parent-son/daughter problems. The concern for the growth and development of the student and its importance to the educator was stressed by Crow and Crow (1954) in their text Introduction to Education.

... School men and women must take cognizance not only of the fact that the potential learner consists of brain or even of brawn, or both, but the fact that he is a complex of phases of growth and development which may or may not follow the same or a similar rate of development. (pp. 129-130)

The Industrial Arts program with its great potential for flexibility, diversity, and adaptability to student needs is indeed a part of the educational system where the physical, emotional, and societal growth needs of the individual can be fulfilled. This of course requires sensitive, creative, and pupil-centered teachers with a sense of education that starts with students and what they are trying to accomplish.

Maximum Involvement Design. The wholeness of the individual's involvement in the educational experience is dependent upon the completeness or global quality of the learning experience design. This refers to the degree to which educational strategies are selected for their potential for providing optimum

involvement in the program or educational design. The concern in this area is that much of what goes on in the public school may be classified as passive or minimal involvement with the substances of the programs.

In order to illustrate this concept of varying degree of involvement in the learning process, a series of strategies for teaching or learning are presented as follows:

- Strategy A This involves listening to a lecture or an audio tape.
- Strategy B This involves the reading of a text or other written material
- Strategy C This involves watching and listening to a television or motion picture presentation.
- Strategy D This involves watching and hearing an actual live demonstration
- Strategy E This involves performing a task or operation under controlled or simulated conditions.
- Strategy F This involves performing the task or operation under actual working conditions and with major responsibility for its effectiveness.

Each of the above deals with a different level or dimension of the communication/learning process. It represents a continuum in range from second-handedness of education to that which might be referred to as first-handed. This is not to imply that reading, listening, or observing are undesirable. They are extremely valuable in the contemporary age as a means of trying to keep abreast of events. The concern here is one of the degree of total involvement for optimum learning, and how educational strategies can be designed or integrated to meet that concern. The Industrial Arts program has an obvious potential for using all such strategies.

On the other hand, it is obvious that a great deal of education is conducted using strategies "A" (listening) and/or "B" (reading). Instruction by such strategies might just as well be conducted with the student staying at home, reading the text and listening to the radio or an audio tape. It is quite obvious that the in-school instruction of this type does not involve the

whole person.

However, if we join strategies "A" (listening), "B" (reading), "C" or "D" (watching/listening), "E" (performing) and finally "F" (performing under actual conditions) it is apparent that a more global or complete process of learning-involvement has taken place. This is the case that can be made for Industrial Arts. It has the potential for an integrated strategy system that extends across the various teaching-learning processes by which the total individual gets put into the instructional schema.

To move this discussion of strategy design and utilization one step further, let us take an actual example of an integrated strategy involvement in the learning process as might be carried out in Industrial Arts.

Goal: The student will develop an understanding of contemporary industry in terms of its organization, materials, products, processes, and personnel, as well as the problems and contributions resulting from such industry. A series of specific objectives could be developed in relation to the above goal.

A second goal with a series of objectives could be developed that would relate to the human competencies of learning, inquiring, and problem solving. Other goals and objectives might be stated in keeping with the thrust of the program. Now, let us look at the range of involvement strategies again with special reference to the previously stated goal.

Strategy A -- listening involvement

The students are involved in listening to a lecture by the teacher, or a tape recording of a presentation, on line production in contemporary industry.

Strategy B -- reading involvement

The students are involved in reading about line production in contemporary industry.

Strategy C -- watching/listening involvement

The students observe and hear a television or motion picture presentation

of a production line in operation as a component of a major industry.

Strategy D -- watching/listening/smelling

The students visit an industry to observe a production line in operation.

Strategy F -- watching/listening/smelling/touching/plus having responsibilities

The students are involved in a line production experience with major responsibility for leadership, financing, design, organization, production, sales, packaging, distribution, and financial accounting.

Now, let us take one more look at this range of involvement strategies as they are depicted on a graph with special reference to the factors in the learning process strategies and the levels of involvement of the person in the various procedures. See figure 3. As the instructional strategies move from "A" to "F", it is quite apparent that the whole person has increased his/her involvement in the process of learning about line production in contemporary industry. It is also important to note that the more contemporary forms of Industrial Arts function at the level of strategy "F" but are supported by strategies "A", "B", "C", and "D".

As a capstone to this particular point or concern in the development of strategies for involving the total person let us look at the particular dimensions of the individual that are or may be involved in such an experience. (A,B,C,D,F).

Sensory System Involvement

Actual use: seeing, hearing, smelling, touching

Possible use: tasting (dependent on product produced)

Intellectual Function Involvement

creating

analyzing

assimilating

perceiving

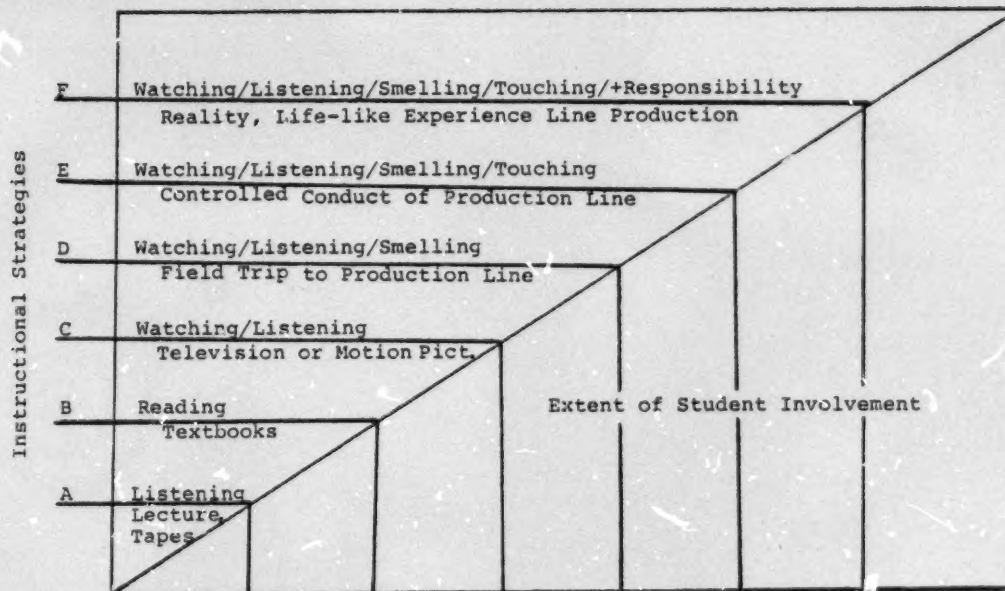


Figure 3.

Learning-Involvement Model Associated with Teaching Industrial Arts
Using a Program Component of Line Production-Enterprise.

Psychomotor Function Involvement

Fine muscle motor control

Large muscle control

Physical control and coordination

Personal Factor Involvement

Pursuit of interests and likes

Development and expression of attitudes

Pursuit of aspirations and curiosities

Utilization of motivations

Expression of emotions, values, satisfactions, cares and concerns

Integrated Activities Associated with Above Categories

Decisioning	Communicating	Following
Valuing	Exploring	Planning
Solving	Adapting	Constructing
Creating	Leading	Evaluating

Developmental Task Involvement

Examples:

1. Independence from adults

Students make decisions about products to be produced.

2. Accepting one's self

The student is recognized for work performed.

3. Shifting peer code

The students establish standards for the product, work performance, quality control, etc.

4. Learning one's role in heterosexual relationships

The student works effectively with other sex persons in decision making and job assignments.

5. Controlling and use of new body

The student engages in physical motor activities such as planeing, sawing, drawing, assembling, and drilling.

6. Using language involving complex concepts

The student draws up a set of safety rules.

7. Moving from the concrete to the abstract

The student discusses the meaning of interchangeable parts, mass production, and company financing as a result of involvement in each.

This has been a brief outline of a total involvement design in which the whole person has been a participant in the educational process. It has potential for involvement of the intellectual, personal-emotion, psycho-motor, and sensory system as well as the developmental tasks at the student's level. The logic behind this discussion of "Industrial Arts Puts the Whole Boy and Girl in the School" grows out of the holistic nature of the human and the reality of how he or she functions. This point is poignantly made by Justin Pikunas (1969) in a statement from his text Human Development: A Science of Growth.

Man is not merely a social being, an emotional creature, an intellectual entity - he is all of these and more all at the same time. His social interaction with others cannot be isolated from his feelings or intellectual functions, or from the multitude of other components which make him what he is. These powers do not merely converge in his person, they fuse with each other to a significant extent. He acts as a unified whole. (p. 8)

The concept of wholeness for the Industrial Arts teacher includes the additional dimension of the physical motor to the social, emotional and intellectual fusion from which an additional measure of the whole person emerges.

It is important to remind the Industrial Arts profession that an over-emphasis on the physical motor functions without equal concern for the social, emotional, and intellectual will leave it with neither acceptance or effectiveness. The Industrial Arts teacher has within his or her grasp an organismic, total-person involvement process for teaching that has few parallels in academic practice. This total-person potential for education involvement is in fact

one of the great strengths of Industrial Arts that needs to be exploited in practice as well as in the literature.

Finally, what can be done to assure that Industrial Arts does in fact fulfill the commitment to the promise that "Industrial Arts Puts the Whole Boy and Girl in the School in 1980?" The following are some suggestions that may prove helpful in this effort.

1. Teacher education programs must emphasize the importance of the many human connections associated with optimum learning experiences.
2. The programs in Industrial Arts must provide for the flexibility conducive to a vast range of potential experiences that may extend into the broadest involvement of the learner.
3. The processes of educational dissection that permit or encourage the separation of the manual or physical motor from the intellectual or from the personal-emotional must be seriously examined and exposed for its fallibility in concept and practice.
4. Greater emphasis must be given to understanding the nature of human functioning and how the individual achieves his/her optimum as an integrated system.
5. The research in Industrial Arts must place greater emphasis on determining and describing the educational advantages accrued from the activity centered experience that has relevance to the education of the whole person.

Postscript

The degree to which the whole person experiences optimally in the Industrial Arts program will in a large measure depend upon two important factors. They are the program and the teacher. The program can provide for the dimension of wholeness of human involvement within a general framework. It can be the skeleton of the body of educational experiences upon which a vast array or kinds of human involvement may be the tissue, muscle, and substance of the completed form.

However, the key to the proposition or concern for wholeness in the human's experience in Industrial Arts or any other subject area is the teacher. The intellectual vitality of Industrial Arts or any other subject field does not reside in a name, a tradition, or an expensive series of volumes. It is largely in the imagination, the ingenuity, and the perspective of the teacher.

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